2. Suggested Resources

SUGGESTED RESOURCES	HOW TO GET A COPY
The County of San Diego Low Impact Development Handbook; Stormwater Management Strategies . (2007). Presents guidance for LID stormwater planning and management techniques. Fact Sheets on LID BMPs are provided in the Appendices.	The County of San Diego The Department of Planning and Land Use 5201 Ruffin Road, Suite B San Diego, CA 92123 http://www.sdcounty.ca.gov/dplu/LID_PR.html www.sdcounty.ca.gov/dplu/
Better Site Design: A Handbook for Changing Development Rules in Your Community (1998) Presents guidance for different model development alternatives.	Center for Watershed Protection 8391 Main Street Ellicott City, MD 21043 410-461-8323 www.cwp.org
California Urban runoff Best Management Practices Handbooks (2003) for Construction Activity, Municipal, and Industrial/Commercial Presents a description of a large variety of Structural BMPs, Treatment Control, BMPs and Source Control BMPs	Los Angeles County Department of Public Works Cashiers Office 900 S. Fremont Avenue Alhambra, CA 91803 626-458-6959 www.cabmphandbooks.org
Caltrans Urban runoff Quality Handbook: Planning and Design Staff Guide (Best Management Practices Handbooks (1998) Presents guidance for design of urban runoff BMPs	California Department of Transportation P.O. Box 942874 Sacramento, CA 94274-0001 916-653-2975
Bioretention Manual (updated 2002) Presents guidance for designing, building, and maintaining bioretention facilities.	Prince George's County Watershed Protection Branch 9400 Peppercorn Place, Suite 600 Landover, MD 20785 http://www.co.pg.md.us/Government/AgencyIndex/DER/ESD/Bioretention/bioretention.asp
Contra Costa Clean Water Program *Stormwater C.3 Guidebook* Includes an integrated design approach to meet California Stormwater NPDES treatment and hydrograph modification management requirements using Low Impact Development site design techniques and facilities.	Contra Costa Clean Water Program 255 Glacier Drive Martinez, CA 94553 www.cccleanwater.org/construction/nd.php
Design of Stormwater Filtering Systems (1996) by Richard A. Claytor and Thomas R. Schuler Presents detailed engineering guidance on ten different urban runoff-filtering systems.	Center for Watershed Protection 8391 Main Street Ellicott City, MD 21043 410-461-8323
Development Planning for Stormwater Management, A Manual for the Standard Urban Stormwater Mitigation Plan (SUSMP), (May 2000)	Los Angeles County Department of Public Works http://dpw.co.la.ca.us/epd/ or http://www.888cleanLA.com

SUGGESTED RESOURCES	HOW TO GET A COPY
Florida Development Manual: A Guide to Sound Land and Water Management (1988) Presents detailed guidance for designing BMPs	Florida Department of the Environment 2600 Blairstone Road, Mail Station 3570 Tallahassee, FL 32399 850-921-9472
Guidance Specifying Management Measures for Sources of Nonpoint Pollution in Coastal Waters (1993) Report No. EPA–840-B-92-002. Provides an overview of, planning and design considerations, programmatic and regulatory aspects, maintenance considerations, and costs.	National Technical Information Service U.S. Department of Commerce Springfield, VA 22161 800-553-6847
Guide for BMP Selection in Urban Developed Areas *(2001)*	*ASCE Envir. and Water Res. Inst.* *1801 Alexander Bell Dr.* *Reston, VA 20191-4400* *(800) 548-2723*
Low-Impact Development Design Strategies - An Integrated Design Approach *(June 1999)*	*Prince George's County, Maryland* *Department of Environmental Resource* *Programs and Planning Division* *9400 Peppercorn Place* *Largo, Maryland 20774* http://www.co.pg.md.us/Government/DER/PPD/pgcounty/lidmain.htm
Maryland Stormwater Design Manual (1999) Presents guidance for designing urban runoff BMPs	Maryland Department of the Environment 2500 Broening Highway Baltimore, MD 21224 410-631-3000
National Stormwater Best Management Practices (BMP) Database, Version 1.0 Provides data on performance and evaluation of urban runoff BMPs	American Society of Civil Engineers 1801 Alexander Bell Drive Reston, VA 20191 703-296-6000
National Stormwater Best Management Practices Database *(2001)*	*Urban Water Resources Research Council of ASCE* *Wright Water Engineers, Inc.* *(303) 480-1700*
Operation, Maintenance and Management of Stormwater Management (1997) Provides a thorough look at storm water practices including, planning and design considerations, programmatic and regulatory aspects, maintenance considerations, and costs.	Watershed Management Institute, Inc. 410 White Oak Drive Crawfordville, FL 32327 850-926-5310
Portland Stormwater Management Manual *(2004)* *Includes design illustrations and criteria for bioretention facilities.*	Environmental Services 1120 SW 5th Ave., Rm. 1000 Portland, OR 97204 503-823-7740 *http://www.portlandonline.com/bes/index.cfm?c=35122&*

SUGGESTED RESOURCES	HOW TO GET A COPY
Potential Groundwater Contamination from Intentional and Non-Intentional Stormwater Infiltration	*Report No. EPA/600/R-94/051, USEPA (1994).*
Preliminary Data Summary of Urban runoff Best Management Practices (August 1999) *EPA-821-R-99-012*	http://www.epa.gov/ost/stormwater/
Reference Guide for Stormwater Best Management Practices *(July 2000)*	*City of Los Angeles* *Urban runoff Management Division* *650 South Spring Street, 7th Floor* *Los Angeles, California 90014* http://www.lacity.org/san/swmd/
Second Nature: Adapting LA's Landscape for Sustainable Living (1999) by Tree People Detailed discussion of BMP designs presented to conserve water, improve water quality, and achieve flood protection.	Tree People 12601 Mullholland Drive Beverly Hills, CA 90210 (818) 623-4848 Fax (818) 753-4625
Start at the Source (1999) Detailed discussion of permeable pavements and alternative driveway designs presented.	Bay Area Stormwater Management Agencies Association 2101 Webster Street Suite 500 Oakland, CA 510-286-1255 www.basmaa.org
Stormwater Management in Washington State (1999) Vols. 1-5 Presents detailed guidance on BMP design for new development and construction.	Department of Printing State of Washington Department of Ecology P.O. Box 798 Olympia, WA 98507-0798 360-407-7529
Stormwater, Grading and Drainage Control Code, Seattle Municipal Code Section 22.800-22.808, and Director's Rules, Volumes 1-4. (Ordinance 119965, effective July 5, 2000)	*City of Seattle* *Department of Design, Construction & Land Use* *700 5th Avenue, Suite 1900* *Seattle, WA 98104-5070* *(206) 684-8880* http://www.ci.seattle.wa.us/dclu/Codes/sgdccode.htm
Texas Nonpoint Source Book – Online Module (1998)www.txnpsbook.org Presents BMP design and guidance information on-line	Texas Statewide Urban runoff Quality Task ForceNorth Central Texas Council of Governments 616 Six Flags Drive Arlington, TX 76005 817-695-9150
The Practice of Watershed Protection by Thomas R. Shchuler and Heather K. Holland	Center for Watershed Protection 8391 Main Street Ellicott City, MD 21043 410-461-8323 www.cwp.org
Urban Storm Drainage, Criteria Manual – Volume 3, Best Management Practices (1999) Presents guidance for designing BMPs	Urban Drainage and Flood Control District 2480 West 26th Avenue, Suite 156-B Denver, CO 80211 303-455-6277

3. City of San Diego Localized Equivalent Area Drainage (LEAD) Method Pilot Study Proposal

The following LEAD method pilot study proposal was made in 2002 by the City of San Diego as an alternative method for meeting treatment control BMP requirements of the Municipal Permit. The City of Chula Vista may consider adopting the method for development and redevelopment projects in the City after the pilot study is complete and the method is approved by the Regional Board.

I. Introduction

The San Diego National Pollutant Discharge Elimination System Municipal Storm Water Permit (Municipal Permit) contains requirements for certain new development and redevelopment projects to comply with Standard Urban Storm Water Mitigation Plans (SUSMPs). SUSMPs include requirements to implement pollutant source controls, to incorporate site design features, and to infiltrate or treat, using structural control measures, a portion of the storm water runoff to be generated by the new development or redevelopment project. The City of San Diego's Storm Water Pollution Prevention Program (Storm Water Program) developed, through collaboration with the Regional Water Quality Control Board (Regional Board), the development industry, and environmental organizations, a process designed to provide more efficient, integrated storm water treatment, resulting in water quality improvements more quickly. This process is called the Localized Equivalent Area Drainage method or "LEAD" method. Fundamental to the LEAD method is the protection of receiving water quality and support of designated beneficial uses through implementation of structural treatment control measures, also known as Best Management Practices (BMPs), to the maximum extent practicable. The LEAD method provides numerous benefits:

- Promotes an integrated, watershed-based storm water treatment by treating runoff from entire sub-drainages once.
- Protects receiving water quality and supports designated beneficial uses through implementation of structural BMPs to the maximum extent practicable.
- Provides for accelerated benefits to receiving waters through implementation of structural BMPs in advance of new development or redevelopment projects.
- Provides the flexibility required for projects being implemented in developed areas of the City where existing infrastructure limits opportunities for efficient BMP implementation.
- Provides increased and more cost-effective opportunities for BMPs to reside in the public domain where BMP operation and maintenance can be assured.

- Promotes efficient and integrated implementation of regional solutions in lieu of end-of-pipe solutions.

II. LEAD Method – Overview

- Key aspects for consideration of the LEAD method include the following:

- The LEAD method is applicable to infill development and redevelopment projects located within existing developed areas.

- The LEAD method is applicable when implementation of BMPs to treat the runoff from an entire watershed or drainage area that would not otherwise require treatment is more feasible, practical, or beneficial to receiving waters than implementation of BMPs to treat the runoff from an individual project's footprint.

- The LEAD method drainage area must be treated prior to discharging to a receiving water supporting beneficial uses.

- All development and redevelopment projects subject to regulation under the SUSMP and which are qualified for the LEAD method must continue to address pollutants and conditions of concern at the project site through site design and source control: only the treatment control BMP requirements would be met at the alternative LEAD watershed.

All development and redevelopment projects subject to regulation under the SUSMP are required to assess the pollutants and conditions of concern associated with the proposed project, and to address these pollutants and conditions through site design, source control, and treatment control BMPs.

When the LEAD method is elected, estimates of pollutant load reductions obtained by treating the runoff from the project footprint in accordance with the SUSMP are made to quantify the reduction goal for the project. Then, an alternative treatment area is identified where an equivalent or greater pollutant load reduction can be obtained. The alternative treatment areas must meet the following requirements:

- Located within the proximity of the project.

- Discharge to the same receiving water as the project.

- Provide for equivalent or greater pollutant load reduction than at the project site.

- Located in a drainage basin where no other requirement for treatment exists and treat the entire flow from the drainage basin.

- BMPs must be implemented and operational before the project is complete.

- Treat runoff from an area equivalent or greater than the project footprint.
- Treat runoff from an equivalent or greater impervious area than the project.

In all cases, the pollutant load reductions obtainable at the alternative LEAD method treatment area must be greater than that obtained at the project site.

III. LEAD Method Pilot Study

The City of San Diego proposes to conduct a pilot study to test the LEAD method and to determine the ability of the LEAD method to promote and to achieve the pollution control objectives of the Municipal Permit. The City of San Diego's Storm Water Pollution Prevention Program is proposed as the pilot study lead agency and will be responsible for carrying out all elements of the study. Key attributes of the pilot study include the following:

- Eligible projects would be limited to areas located within existing developed areas of the City of San Diego. Projects would be limited to urbanized areas to ensure potential LEAD watersheds would not drain into receiving waters supporting beneficial uses prior to treatment at the LEAD method BMP location.
- Eligible projects will be limited to projects permitted by the City of San Diego to ensure adequate oversight by the City of San Diego.
- A LEAD method pilot study annual report will be submitted to the Regional Board each year of the study. The annual report will include a summary of progress of the pilot study over the previous year, changes proposed for the next year, and lists of projects where the method was applied, including a discussion of the results for each project. The annual report will keep the Regional Board apprised of the progress and results of the pilot study.

The remainder of this pilot study proposal describes a proposed methodology that would be used to develop a project under the LEAD method. The document also presents a proposed methodology for completing the details of the methodology through collaboration between the City, the Regional Board, the development industry, and environmental organizations.

IV. LEAD Methodology

The general methodology for developing a project under the LEAD method is described in this section and illustrated in Figure 3.2.

Step 1 – Determine Project Pollutant Reduction Treatment Goal

1a – Identify Pollutants and Conditions of Concern

Using the process identified in Section 3 of this Manual, determine whether the project would generate pollutants and/or conditions of concern. This step includes:

- Identify proposed project type or category and anticipated and potential pollutants generated (Section 3.VI.1.a).
- Identify pollutants of concern in the receiving waters to which the project would discharge (Section 3.VI.1 b and c).
- Identify those constituents that are potentially generated from the project or land use type and are pollutants of concern in the receiving waters. These are the pollutants of concern for this project. If project would discharge to receiving water that does not have specific listed pollutants of concern, select representative pollutants for the project category as shown in Table 3.1.

Determine if project qualifies for the LEAD method. For a project to qualify for the LEAD method, it must meet all of the following criteria:

- The LEAD method is applicable to infill development and redevelopment projects located within existing developed areas of the City of San Diego where acceptable potential LEAD sub-drainages are located in the project's immediate vicinity.
- The LEAD method is applicable when implementation of BMPs to treat the runoff from an entire watershed or drainage area that would not otherwise require treatment is more feasible, practical, or beneficial to receiving waters than implementation of BMPs to treat the runoff from an individual project's footprint.
- The LEAD method is limited to projects within and permitted by the City of San Diego.
- The project must propose adequate site design and source controls in the original project design.

1b – Estimate Project Site Pollutant Loading

Estimate the pollutant loading for the developed qualifying project based on proposed site land use, characterization data, and water quality design volume. This includes:

- Delineate project drainage area into land use types.
- Determine the water quality design volume for each land use type based on drainage areas, impervious factors, runoff coefficient, and the methods prescribed in the SUSMP.

- Determine representative pollutant event mean concentration for each pollutant of concern and land use type using Table 3.4 (to be developed). Calculate Average Pollutant Loading = Event Mean Concentration x Water Quality Design Volume (repeat for each pollutant of concern).

1c – Determine Candidate Treatment Control BMPs for Project

Using the process identified in the SUSMP, and the pollutants of concern identified in Step 1a, select appropriate BMPs from either Table 3.2 – Site Design and Source Control Storm Water BMP Selection Matrix, and Table 3.3 – Treatment Control BMP Selection Matrix. The BMP selection should take into account both the pollutants of concern and site factors.

1d – Determine Pollutant Reductions

Calculate the pollutant load reduction resulting from the selected BMPs for each of the pollutants for which pollutant loadings were determined under Step 1b. This includes:

- Determine the average percentage pollutant reduction for the BMPs using Table 3.5 (to be developed).

- Apply the pollutant load percent reduction to the average pollutant load estimate developed under Step 1b to determine the average load reduction with BMPs.

This average load reduction is the minimum pollutant reduction treatment goal for an alternative LEAD method treatment area.

Step 2 – Evaluate LEAD Method Treatment Area

2a – Determine LEAD Project Characteristics

Locations for candidate LEAD method BMPs will be identified in master drainage plans and will drain to the same receiving water as the qualifying project(s). Once the LEAD method treatment area is selected from the master drainage plan, key characteristics of the LEAD method treatment area watershed/sub-watershed must be determined. This includes:

- Existing land use(s) and area(s) and impervious factor.

- Drainage area.

- Rainfall characteristics.

2b – Determine Water Quality Design Volume

Estimate the water quality design volume for the LEAD method treatment area using the methods prescribed in the SUSMP. This includes:

- Delineate project drainage area into land use types.
- Determine the water quality design volume for each land use type based on drainage areas, impervious factors, runoff coefficient, and the methods prescribed in the SUSMP.

2c – Determine Loading for LEAD Method Treatment Area Pollutants of Concern

Determine representative pollutant event mean concentration for each pollutant of concern and land use type using Table 3.4 (to be developed). Calculate Average Pollutant Loading = Event Mean Concentration x Water Quality Design Volume (repeat for each pollutant of concern). This calculation must be made for the potential LEAD method treatment area for the same pollutants of concern identified in Step 1a for the project site.

2d – Determine Candidate Treatment Control BMPs for LEAD Method Treatment Area

LEAD method treatment area BMPs will be identified in master drainage plans. The BMPs identified in the master drainage plans will take into account the pollutants of concern identified in Step 1a, and will have been selected from either Table 3.2 – Site Design and Source Control Storm Water BMP Selection Matrix, and Table 3.3 – Treatment Control BMP Selection Matrix.

2e – Determine Pollutant Reductions

Calculate the pollutant load reduction resulting from the selected LEAD method treatment area BMPs for each of the pollutants for which average pollutant loadings were determined under Step 2c. This includes:

- Determine the average percentage pollutant reduction for the BMPs using Table 3.5 (to be developed).
- Apply the pollutant load percent reduction to the average pollutant load estimate developed under Step 2c to determine the average load reduction with the BMPs for each of the pollutants.

2f – Compare LEAD Method Treatment Area with Qualifying Project Requirements

Compare the pollutant load reduction for the LEAD method treatment area with the pollutant reduction treatment goal for the qualifying project determined under Step 1d:

- If LEAD method Treatment Area Pollutants of Concern Load < Project Pollutants of Concern Load, repeat process with another LEAD site.
- If LEAD method Treatment Area Pollutants of Concern Load = Project Pollutants of Concern Load, LEAD method Treatment Area is acceptable – Implement BMPs at LEAD method treatment area.
- If LEAD method Treatment Area Pollutants of Concern Load > Project Pollutants of Concern Load, LEAD method Treatment Area is acceptable – Implement BMPs at LEAD method treatment area.

While the comparison must be made for all pollutants of concern, there will typically be one pollutant of concern that will govern the comparison for any given combination of qualifying and LEAD project characteristics.

V. LEAD Method Pilot Study Evaluation

Fundamental to the LEAD method pilot study is the annual evaluation of the program. The City of San Diego proposes to develop the monitoring and evaluation methodology with San Diego BayKeeper, the American Public Works Association, and technical experts. The methodology would include a descriptive, qualitative component to evaluate indirect measures, which would minimally include the factors listed below. If funding becomes available, the evaluation methodology would include monitoring of the LEAD watershed and a similar watershed with treatment of an individual project site. As lead agency responsible for carrying out the pilot study, the City of San Diego's Storm Water Pollution Prevention Program will report the results of the program evaluation in an annual report to the Regional Board.

The annual program report will include the following elements:

- Listing and description of project(s) to date where the LEAD method was applied. The listing will include the name and location of each project site and associated LEAD method treatment area. The description will include for each project site and associated LEAD method treatment area: identification of receiving waters; identification of pollutants and conditions of concern; a tabulation of post-project land use; a tabulation of pollutant loading estimates for each pollutant of concern, both without and with BMPs; a listing of the

maintenance requirements and evaluation of how effectively the requirements have been fulfilled; and a listing of site design, source control, and structural treatment control BMPs implemented at the project site or LEAD method treatment area.

- Listing and description of projects currently in the planning stage that are being evaluated for application of the LEAD method during the next 12-month period, where these are known at the time the annual report is submitted.

- Proposed changes in the LEAD method to be implemented during the next 12-month period.

The primary criterion for evaluating the effectiveness of the LEAD method will be to compare the loading of pollutants of concern that are removed at LEAD method treatment areas compared to pollutants of concern that would have been removed at the project site. A secondary criterion for evaluating the effectiveness of the LEAD method will be to compare the timing of BMPs implemented under the LEAD method with the timing under which BMPs might have been implemented outside the program. In general, the LEAD method will be considered to be effective when, 1) pollutant of concern loadings removed as a result of application of the LEAD method exceed loadings that would have been removed at the project site, and 2) BMPs are implemented in advance of the timing that would have been required without the LEAD method.

Additional criteria for evaluating the effectiveness of the LEAD method will be developed as part of the pilot study and will be discussed in the first annual report.

VI. LEAD Method Issues to be Further Developed

This LEAD method pilot study proposal provides a detailed framework for discussion between the City, the Regional Board, the development industry, and environmental organizations toward creating an acceptable LEAD method program. In addition to reaching agreement on the overall framework, several key issues will require significant additional development during the initial implementation of the pilot study. Several specific topics include:

- Establishing land use or project category based event mean concentrations.

- Establishing BMP performance standards for common BMP types.

- Determining how to compare a LEAD method treatment area with a qualifying project when one or both projects propose a flow-based BMP methodology.

Each of these is briefly discussed further.

Establishing Event Mean Concentrations for Calculating Pollutant Loads

In order to calculate pollutant loads, typical event mean concentrations for the potential pollutants of concern must be established for land uses and/or project categories to populate a table such as the suggested Table 3.4.

- For a number of the common land uses, sufficient land-use based monitoring has been conducted within San Diego County and throughout Southern California (e.g., data compiled by the Southern California Coastal Watershed Research Project) that a set of reasonable values for use in equivalent calculations can be established for a number of the potential pollutants of concern. This is true for such pollutants as total suspended sediment, nutrients, heavy metals, oxygen demanding substances (e.g., biological oxygen demand or carbonaceous oxygen demand), oil and grease, and certain indicator bacteria.

    - Data on other organic compounds is by and large below detection limits and it would be difficult to establish meaningful factors, so it is recommended that this not be included in an analysis.

    - Data on pesticides is highly variable and often non-detectable and would be difficult to establish meaningful values.

Data on trash is just now beginning to be compiled and will be highly variable. It is assumed that both a qualifying project and a LEAD method treatment area would incorporate trash/debris removal as part of the overall plan, and therefore calculating trash loads is also not recommended.

Establishing BMP Performance

In order to calculate pollutant loads, removal performance data for the potential pollutants of concern must be established for BMP categories to populate a table such as the suggested Table 3.5.

- Sufficient data has been published for both operating BMPs and pilot plant research from a number of sources throughout the country that a set of reasonable values for use in equivalent calculations can be established for a number of the potential pollutants of concern. This is true for such pollutants as total suspended sediment, nutrients, heavy metals, oxygen demanding substances (e.g., biological oxygen demand and carbonaceous oxygen demand), oil and grease and to a lesser extent certain indicator bacteria.

- BMP performance data for removal of other organic compounds suggests performance is by and large below detection limits and it would be difficult to establish meaningful factors, so it is recommended that this not be included in an analysis.

- BMP performance data for the removal of low levels of pesticides is generally not available.

- Data on trash removal through BMPs is just now beginning to be compiled and will be highly variable. It is assumed that both a qualifying project and a LEAD method treatment area would incorporate trash/debris removal as part of the overall plan, and therefore calculating trash loads is also not recommended.

Comparing Flow-Based BMPs

If a flow-based BMP approach (e.g. vegetated swales, biofilters, hydrodynamic separator) is proposed for either the qualifying project or the LEAD method treatment area, a direct calculation of volume of runoff treated and pollutant load reduced is substantially more complex than for volume-based BMPs (e.g., detention, retention). Methods can be established by evaluating hydrologic data and to develop an approximate relationship between maximum flow treatment capacity and estimated volume treated or continuous simulation models such as the Storage Treatment Overflow Model could be run for each site.

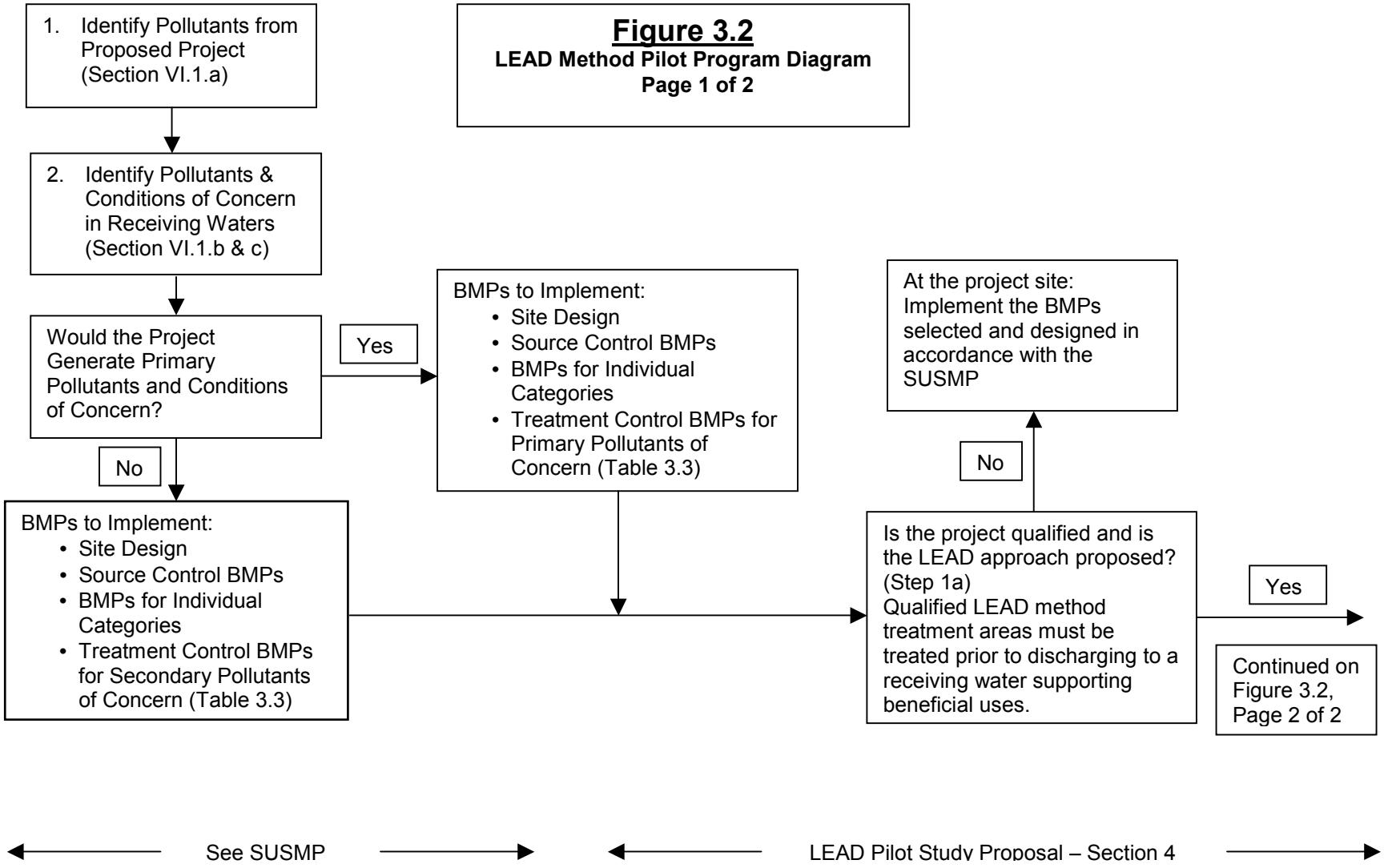

Figure 3.2
LEAD Method Pilot Program Diagram
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Figure 3.2
LEAD Method Pilot Program Diagram
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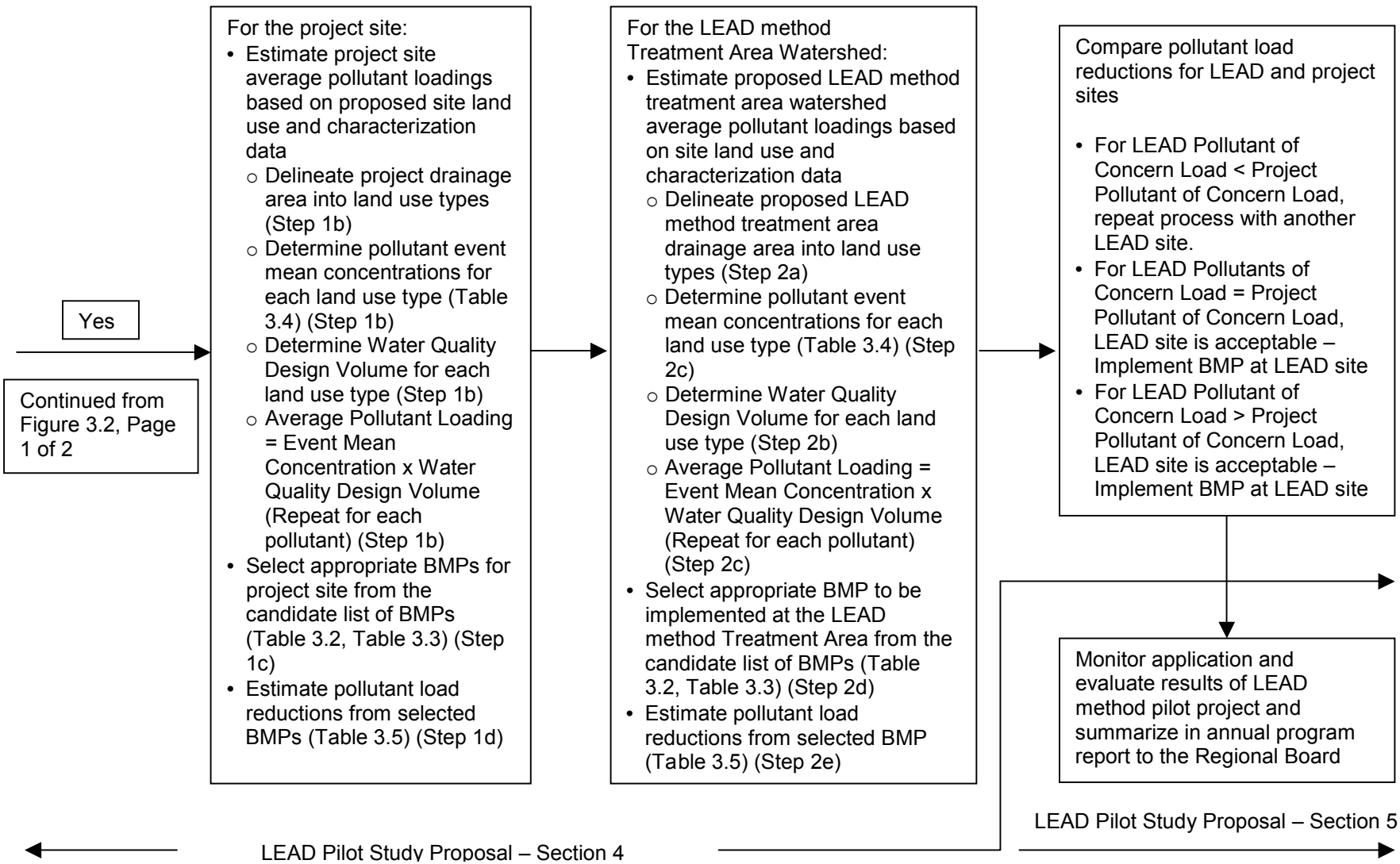

Table 3.4
Pollutant Event Mean Concentrations

Land Use Priority Project Categories	Pollutant Event Mean Concentrations								
	Sediments	Nutrients	Heavy Metals	Organic Compounds	Trash & Debris	Oxygen Demanding Substances	Oil & Grease	Bacteria & Viruses	Pesticides
Detached Residential Development									
Attached Residential Development									
Commercial Development > One Acre									
Automotive Repair Shops									
Restaurants									
Hillside Development > 5,000 ft^2									
Parking Lots									
Streets, Highways & Freeways									

Note: This table will be populated with information developed through collaboration between the City, the Regional Board, the development industry, environmental organizations, and technical experts.

Table 3.5
BMP Performance Percentage Removal

Pollutant of Concern	Treatment Control BMP Categories						
	Biofilters	Detention Basins	Infiltration Basins	Wet Ponds or Wetlands	Drainage Inserts	Filtration	Continuous Flow Deflection Systems
Sediments							
Nutrients							
Heavy Metals							
Organic Compounds							
Trash & Debris							
Oxygen Demanding Substances							
Oil & Grease							
Bacteria & Viruses							
Pesticides							

Note: This table will be populated with information developed through collaboration between the City, the Regional Board, the development industry, environmental organizations, and technical experts.